

STSM title:

Effects of Genetic Selection for Increased Milk Yield on Sheep Welfare

Background: Flock health and fitness outputs constrain decidedly dairy sheep productivity and welfare (Matheson *et al.* 2012 *Behav Genet* 42:899-911; Gowane *et al.* 2014 *Agric Res* 3:75-82). With genetic selection for resistance to disease being often overlooked and regarded as time-consuming due to the low additive genetic variances and heritabilities of such traits (h^2 ranging from 0.01 to 0.08) (Notter 2012 *Anim Reprod Sci* 130:147-151; Zishiri *et al.* 2013 *Small Rumin Res* 112:39-48). In order to formulate proper animal health management and effective disease control measures, accurate estimates of the extent and prevalence of the main technopaties are required (Cross *et al.* 2010 *Prev Vet Med* 96:252-262.; Willeberg 2012 *Prev Vet Med* 105:287-296). However, the literature on dairy ewes fitness characteristics is limited. Furthermore, knowledge of the occurrence rates of various health disorders is important for both veterinarians and researchers, in order to set-out ,alarm' thresholds, which will then help sheep breeders to monitor more effectively their flocks health and also during the decision making process. Tsigai is a traditional triple-purpose sheep group (meat-milk-wool), widely distributed across regions of Central, Eastern and Southern Europe (Cinkulov *et al.* 2008 *Genet Sel Evol* 40:321-331). Production levels vary greatly among countries and regions which rear Tsigai sheep, conception rates of 103-160%, adult body weights in ewes of 35-80 kg and milk yields of 70 to 200 kg/lactation (Kusza *et al.* 2008 *Small Rum Res* 78:13-23). To the best of our knowledge, no other comparative study concerning the fitness and health traits of different Tsigai genotypes exists up to this moment.

OBJECTIVE of the current study is to evaluate the health and fitness indicators in three Tsigai sheep populations, divergently selected for milk (Szombor), meat (Cokanszki) and unimproved (mountain type).

Start date: 2015-10-01

End date: 2015-11-20

The comparative study will be carried out at the Experimental Farm of the University of Debrecen (site 1, purebred Cokanszki Tsigai, used as reference flock, n=175 heads) and in two commercial farms that are rearing Szombor (site 2, dairy intensively selected, n=360 heads) and unimproved (site 3, mountain type, ≥ 400 heads), respectively.

Data needed for the implementation of the current study will be taken from the farm and the veterinarian's registers, and from the pedigree available information (official performance and recording data).

Traits to be included in the comparative study (12 traits), among the three Tsigai populations (dairy, meat and mountain-unimproved):

Work Plan STSM - Gavojdian Dinu - COST Action FA1308 DairyCare

- survival rates of adult ewes; - survival rates in lambs (birth-weaning, weaning-slaughter);- voluntary culling in ewes; - productive longevity; - age at first mating;- conception rate; - prolificacy; - milkability; - mastitis incidence; - lameness incidence; - pneumonia incidence; - abortion incidence.

In order to assess the effect of the genotype (the three divergent selected populations) on the above-mentioned health disorders, as well as on the reproduction performance of the ewes, the STATISTICA software will be used (Hill and Lewicki, 2007). The Main Effect ANOVA analysis of variance will be applied. Given that data will be gathered from records of two-three consecutive production cycles (years), the model will include a correction factor. The model to be used for the statistical analysis is being presented below:

$$y_{ijk} = \mu + pc_i + g_j + e_{ijk}$$

where y_{ijk} is the studied reproduction or health trait; μ is the overall mean; pc_i represents the fix effect of production cycle with two levels; g_j represents the random effect of the genotype with three levels: milk, meat and unimproved; and e_{ijk} is the residual effect. When significant effects of the genotype will be observed, the comparison among populations will be tested by performing contrast analysis, using Tukey test.

The research activities included in the current research project will be performed in accordance with the European Union's Directive 2010/63/EU for animal experimentation. Additionally, research trials will have to be approved by the Ethics Committee of the Host Institution before the beginning of the activities included in the research trial.

Results of the study will be made available to the Tsigai Sheep Breeders Society, in order to help them formulate new selection traits for the breed, and thus be able to design effective genetic improvement programmes to improve overall the productivity and welfare of this three divergently selected populations.

Furthermore, we plan for the results of the current study to be submitted for publication to a peer-reviewed journal (available as an open access resource), presenting acknowledgments for the FA1308 COST Action.

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